

Stachybotrys chartarum
a mold that may be found in water-damaged homes

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Stachybotrys chartarum ecology

Stachybotrys chartarum (SC) is a greenish black mold that grows on material with a high cellulose content, such as fiberboard, the paper covering of gypsum wallboard, wallpaper, dust, and wood when these become chronically water damaged. This mold requires very wet conditions for days or weeks in order to grow. Excessive indoor humidity resulting in water vapor condensation on walls, plumbing leaks, spills from showering or bathing, water leaking through foundations or roofs may lead to growth of many types of mold, including *Stachybotrys*. No one knows how frequently this mold is found indoors since buildings are not routinely tested for its presence.

Toxin production

Stachybotrys chartarum is one of many molds that are capable of producing one or more mycotoxins (chemicals produced by molds that may be able to cause symptoms or illness in people). It has recently gained notoriety as some strains are capable of producing a very potent toxin. However, finding *Stachybotrys* within a building does not necessarily mean that occupants have been exposed either to allergens (pieces of the fungus or spores that can cause allergic symptoms in people prone to allergies) or toxins produced by this fungus. Laboratory studies indicate that molds such as *Stachybotrys* that have the ability to produce toxins do not always do so. Whether a mold produces a toxin while growing in a building may depend on what the mold is growing on, conditions such as temperature, pH, humidity or other unknown factors. When mycotoxins are present, they occur on spores and the small mold fragments that may be released into the air. While *Stachybotrys* is growing, a wet slime layer covers its spores, preventing them from becoming airborne. However, when the mold dies and dries up, air currents or physical handling can cause spores to become airborne. There are no commercial laboratory tests currently available that can detect mycotoxins in a building where molds are present.

Health Effects

Health problems associated with *Stachybotrys chartarum* were first noted in Russian and Eastern European farm animals that ate moldy hay in the 1930's and 1940's. Horses eating heavily SC-contaminated fodder experienced immune system suppression, infection and bleeding that was fatal with high doses. The first reported human health effects were seen in agricultural workers who handled the moldy straw or hay. These high level exposures were associated with coughing,

runny nose, burning sensations in the mouth or nose, nose bleeds, headache, fatigue and skin irritation (rashes and itching) at the site of moldy hay contact.

Much less is known about health effects of SC when it occurs in indoor environments, such as homes or office buildings, where the most likely route of exposure is inhalation. If large numbers of SC spores are released into the air, some people may develop symptoms such as coughing, wheezing, runny nose, irritated eyes or throat, skin rash, fatigue or diarrhea. Researchers have theorized that these symptoms may result from toxins produced by SC or exposure to a combination of several molds or bacteria and the chemicals they produce. Most people who experience health effects associated with moldy buildings fully recover following removal and clean-up of the mold contamination.

Much of the concern about toxin-producing indoor molds and especially *Stachybotrys* followed its identification in the mid-1990s in the homes of a small number of Cleveland infants with an unusual form of lung bleeding. The original investigation, cosponsored by the U.S. Centers for Disease Control and Prevention (CDC) suggested that very wet homes and *Stachybotrys* growth played a role in these lung hemorrhage cases. However, after reviewing the methods used to conduct the original study, the CDC concluded in May, 2000 that a possible association between the lung bleeding in the Cleveland infants (now called "acute idiopathic pulmonary hemorrhage") and exposure to molds, specifically *Stachybotrys chartarum*, was not proven. However, both the CDC and other research groups are continuing to examine the role of indoor molds in both child and adult health, particularly for those molds that may produce toxins.

How can I tell if my health problems are caused by *Stachybotrys*?

It is currently difficult to prove that individual health symptoms are due to SC exposure for several reasons:

- 1) When buildings are sampled, usually several other molds or bacteria (some capable of producing chemicals such as endotoxin) are found in addition to SC, and these may also contribute to symptoms;
- 2) These symptoms are very nonspecific and may be related to exposure to other sources (such as dust mites, animal dander, pollen or other allergens) or to infectious agents such as viruses that cause common colds or flu;
- 3) Research has not identified how much *Stachybotrys* exposure is necessary to produce symptoms;
- 4) There is no test that can determine if a person was exposed to this fungus or its toxins.

Laboratory Tests for Human Exposure to SC mold or toxins

A few physicians have used a blood antibody test to determine whether their patients have been exposed to the SC mold or its toxins. However, this procedure has not been proven to be valid. In one study of 48 people exposed to SC, only 4 had elevated antibodies. The *Stachybotrys* antibody test can also be positive when an individual is exposed to other types of mold altogether (i.e., cross-reaction). Therefore this test cannot be used to definitively determine whether someone has been exposed to the *Stachybotrys* mold or its toxins. In addition, since we do not know how long

antibodies remain elevated after SC exposure, it is also possible that a positive test may be evidence of a previous encounter with SC or a cross-reacting mold, not a current one.

Prevention of Mold in Dwellings

As part of routine building maintenance, buildings should be inspected for evidence of water damage and visible mold. Water damage should be corrected early (within 48 hours) and building surfaces or furnishings dried to prevent mold growth. If any type of visible mold growth is found, whether *Stachybotrys* or any other mold, the water damage leading to it should be corrected and visible mold removed by appropriate methods as described below.

Correction of Visible Mold

Visible mold should be removed by the simplest and easiest method that is proper and safe. Common household molds found around bathtubs or between shower tiles should be removed with a household cleanser. For building components like walls or ceilings showing any type of fungal growth, including *Stachybotrys*, specific methods for removal are based on the extent of visible contamination and underlying water damage. New York City Department of Health produced a set of voluntary guidelines in April, 2000 that incorporate the best available knowledge on removing mold contaminated building components. Their recommendations are summarized here, but the full text should be consulted before deciding on a remediation strategy. Text is available at the New York City Department of Health website listed at the end of this document.

- 1) **Level I** : If the area of mold is small and isolated (10 square feet or less) – e.g., ceiling tiles, small areas on walls
 - A) The area can be cleaned by individuals who have received training on proper clean up methods, protection and potential health hazards. These individuals should be free from asthma, allergy and immune disorders. Gloves, eye protection and an N95 disposable respirator (available at neighborhood hardware stores) should be worn.
 - B) Contaminated material that cannot be cleaned should be removed and placed in a sealed plastic bag before taking it out of the building. This will prevent contamination of other parts of the building.
 - C) The work area and areas used by the remediation workers while exiting the building should be cleaned with a damp cloth or mop. All areas should be left dry and visibly free of mold contamination and debris.
- 2) **Level II**: mid-sized isolated areas (10-30 square feet) – e.g., a wallboard panel

The recommendations are the same as Level I, with the added precaution that

- A) Moldy materials should be covered with plastic sheets and taped before any handling or removal is done. For instance, a moldy panel of gypsum wallboard should have plastic sheeting taped over the affected area on the wall before it is cut to remove the

contaminated section. Once cut from the wall, that section should be placed inside another layer of plastic and sealed up with tape before it is carried through the building for disposal.

- B) Following removal of contaminated material, the work area and exit areas should be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particular Air filter) in addition to cleaning with a damp cloth or mop.
- 3) **Levels III, IV, V:** Large area (more than 30 square feet) – e.g., several wallboard panels or more

A health and safety professional with experience performing microbial investigations should be consulted prior to any cleaning activities to provide oversight for the project. See the specific recommendations in “Guidelines on Assessment and Remediation of Molds in Indoor Environments”, New York City Department of Health, on their website (see Additional Resources). If you do not have access to the Internet you may request a copy through the California Department of Health Services Indoor Air Quality Assistance Line at (510) 540-2476.

Summary

Exposure to high levels of *Stachybotrys chartarum* and other mold spores may cause health symptoms in some individuals. Therefore, any fungal growth on building materials should be cleaned off or removed as rapidly as possible to maintain a healthy indoor environment. New York City Department of Health guidelines provide detailed information on mold remediation strategies and are available from their website (see Additional Resources).

At present there is no environmental test to determine whether *Stachybotrys* growth found in buildings is producing toxins. There is also no blood or urine test that can establish if an individual has been exposed to *Stachybotrys chartarum* spores or its toxins. Anyone with persistent health problems that they believe may be related to indoor molds should consult their physician.

Additional Resources

New York City Department of Health. Guidelines on Assessment and Remediation of Molds in Indoor Environments. Full text document available at <http://www.ci.nyc.us/health>. For further information about this document contact New York City Department of Health at (212) 788-4290.

U.S. E.P.A. Indoor Air Quality Web Site – Mold Links and General Information Page
<http://www.epa.gov/iedweb00/pubs/moldresources.html>

U.S. E.P.A. Indoor Air Quality Information Clearinghouse: 1-800-438-4318
For information on many types of indoor air contaminants.

Centers for Disease Control and Prevention. Questions and Answers on *Stachybotrys chartarum* and other molds <http://www.cdc.gov/nceh/asthma/factsheets/molds/default.htm>

Centers for Disease Control and Prevention. Update: Pulmonary Hemorrhage/Hemosiderosis Among Infants – Cleveland, OH, 1993-1996. Morbidity and Mortality Weekly Report 49(09):180-4 March 10, 2000. Full text available: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4909a3.htm>